

# MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

**SMAJXXXA(CA)**

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**Product specification**

## Description

Transient voltage suppression diodes, also known as TVS diodes, are protective electronic parts that protect electrical equipment from voltage spikes introduced by wires.

## Applications

- computer system
- domestic appliance
- video input


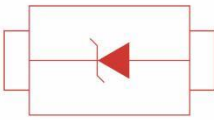


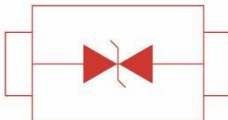

## Features

- For surface mounted applications
- Excellent clamping capability
- 400 W peak pulse power capability with a 10/1000 $\mu$ s Waveform.
- $V_{RWM}$  3.3-550V
- Low profile package and low inductance
- Typical IR less than 1 $\mu$ A above 10V
- Fast response time: typically less than 1.0ps from 0V to  $V_{BRmin}$ .

## Mechanical Characteristics

- Package: SMA/DO-214AC
- Case Material: Molded Plastic. UL Flammability
- Classification Rating 94V-0
- Moisture Sensitivity: Meet MSL 1
- Terminal: Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Weight: 0.07g(Approximate)

## Reference News

| PACKAGE OUTLINE   | PIN CONFIGURATION   | Marking Information  |
|---|---|--|
|  |  |  |
| <b>Unipolar</b>   |   |  |
|  |  |  |
| <b>Bipolar</b>  |   |  |

**Electrical Characteristics (T=25°C)**

| Part Number |           | Marking  |           | V <sub>R</sub> | I <sub>R</sub> @ V <sub>R</sub> | V <sub>BR</sub> @ I <sub>T</sub> |        | I <sub>T</sub> | V <sub>C</sub> @ I <sub>PP</sub> | I <sub>PP</sub> Ⓞ |
|-------------|-----------|----------|-----------|----------------|---------------------------------|----------------------------------|--------|----------------|----------------------------------|-------------------|
| Uni- Polar  | Bi- Polar | Uni      | Bi        | V              | μA                              | min(V)                           | max(V) | mA             | max(V)                           | A                 |
| SMAJ3.3A    | /         | SMAJ3.3A | /         | 3.3            | 200                             | 5.2                              | 6      | 10             | 8.0                              | 50.00             |
| SMAJ5.0A    | SMAJ5.0CA | SMAJ5.0A | SMAJ5.0CA | 5.0            | 800                             | 6.40                             | 7.00   | 10             | 9.2                              | 43.48             |
| SMAJ6.0A    | SMAJ6.0CA | SMAJ6.0A | SMAJ6.0CA | 6.0            | 800                             | 6.67                             | 7.37   | 10             | 10.3                             | 38.84             |
| SMAJ6.5A    | SMAJ6.5CA | SMAJ6.5A | SMAJ6.5CA | 6.5            | 500                             | 7.22                             | 7.98   | 10             | 11.2                             | 35.72             |
| SMAJ7.0A    | SMAJ7.0CA | SMAJ7.0A | SMAJ7.0CA | 7.0            | 200                             | 7.78                             | 8.60   | 10             | 12.0                             | 33.34             |
| SMAJ7.5A    | SMAJ7.5CA | SMAJ7.5A | SMAJ7.5CA | 7.5            | 100                             | 8.33                             | 9.21   | 1              | 12.9                             | 31.01             |
| SMAJ8.0A    | SMAJ8.0CA | SMAJ8.0A | SMAJ8.0CA | 8.0            | 50                              | 8.89                             | 9.83   | 1              | 13.6                             | 29.42             |
| SMAJ8.5A    | SMAJ8.5CA | SMAJ8.5A | SMAJ8.5CA | 8.5            | 20                              | 9.44                             | 10.40  | 1              | 14.4                             | 27.78             |
| SMAJ9.0A    | SMAJ9.0CA | SMAJ9.0A | SMAJ9.0CA | 9.0            | 10                              | 10.00                            | 11.10  | 1              | 15.4                             | 25.98             |
| SMAJ10A     | SMAJ10CA  | SMAJ10A  | SMAJ10CA  | 10.0           | 5                               | 11.10                            | 12.30  | 1              | 17.0                             | 23.53             |
| SMAJ11A     | SMAJ11CA  | SMAJ11A  | SMAJ11CA  | 11.0           | 1                               | 12.20                            | 13.50  | 1              | 18.2                             | 21.98             |
| SMAJ12A     | SMAJ12CA  | SMAJ12A  | SMAJ12CA  | 12.0           | 1                               | 13.30                            | 14.70  | 1              | 19.9                             | 20.11             |
| SMAJ13A     | SMAJ13CA  | SMAJ13A  | SMAJ13CA  | 13.0           | 1                               | 14.40                            | 15.90  | 1              | 21.5                             | 18.61             |
| SMAJ14A     | SMAJ14CA  | SMAJ14A  | SMAJ14CA  | 14.0           | 1                               | 15.60                            | 17.20  | 1              | 23.2                             | 17.25             |
| SMAJ15A     | SMAJ15CA  | SMAJ15A  | SMAJ15CA  | 15.0           | 1                               | 16.70                            | 18.50  | 1              | 24.4                             | 16.40             |
| SMAJ16A     | SMAJ16CA  | SMAJ16A  | SMAJ16CA  | 16.0           | 1                               | 17.80                            | 19.70  | 1              | 26.0                             | 15.39             |
| SMAJ17A     | SMAJ17CA  | SMAJ17A  | SMAJ17CA  | 17.0           | 1                               | 18.90                            | 20.90  | 1              | 27.6                             | 14.50             |
| SMAJ18A     | SMAJ18CA  | SMAJ18A  | SMAJ18CA  | 18.0           | 1                               | 20.00                            | 22.10  | 1              | 29.2                             | 13.70             |
| SMAJ20A     | SMAJ20CA  | SMAJ20A  | SMAJ20CA  | 20.0           | 1                               | 22.20                            | 24.50  | 1              | 32.4                             | 12.35             |
| SMAJ22A     | SMAJ22CA  | SMAJ22A  | SMAJ22CA  | 22.0           | 1                               | 24.40                            | 26.90  | 1              | 35.5                             | 11.27             |
| SMAJ24A     | SMAJ24CA  | SMAJ24A  | SMAJ24CA  | 24.0           | 1                               | 26.70                            | 29.50  | 1              | 38.9                             | 10.29             |
| SMAJ26A     | SMAJ26CA  | SMAJ26A  | SMAJ26CA  | 26.0           | 1                               | 28.90                            | 31.90  | 1              | 42.1                             | 9.51              |
| SMAJ28A     | SMAJ28CA  | SMAJ28A  | SMAJ28CA  | 28.0           | 1                               | 31.10                            | 34.40  | 1              | 45.4                             | 8.82              |
| SMAJ30A     | SMAJ30CA  | SMAJ30A  | SMAJ30CA  | 30.0           | 1                               | 33.30                            | 36.80  | 1              | 48.4                             | 8.27              |
| SMAJ33A     | SMAJ33CA  | SMAJ33A  | SMAJ33CA  | 33.0           | 1                               | 36.70                            | 40.60  | 1              | 53.3                             | 7.51              |
| SMAJ36A     | SMAJ36CA  | SMAJ36A  | SMAJ36CA  | 36.0           | 1                               | 40.00                            | 44.20  | 1              | 58.1                             | 6.89              |
| SMAJ40A     | SMAJ40CA  | SMAJ40A  | SMAJ40CA  | 40.0           | 1                               | 44.40                            | 49.10  | 1              | 64.5                             | 6.21              |
| SMAJ43A     | SMAJ43CA  | SMAJ43A  | SMAJ43CA  | 43.0           | 1                               | 47.80                            | 52.80  | 1              | 69.4                             | 5.77              |
| SMAJ45A     | SMAJ45CA  | SMAJ45A  | SMAJ45CA  | 45.0           | 1                               | 50.00                            | 55.30  | 1              | 72.7                             | 5.51              |
| SMAJ48A     | SMAJ48CA  | SMAJ48A  | SMAJ48CA  | 48.0           | 1                               | 53.30                            | 58.90  | 1              | 77.4                             | 5.17              |
| SMAJ51A     | SMAJ51CA  | SMAJ51A  | SMAJ51CA  | 51.0           | 1                               | 56.70                            | 62.70  | 1              | 82.4                             | 4.86              |
| SMAJ54A     | SMAJ54CA  | SMAJ54A  | SMAJ54CA  | 54.0           | 1                               | 60.00                            | 66.30  | 1              | 87.1                             | 4.60              |
| SMAJ58A     | SMAJ58CA  | SMAJ58A  | SMAJ58CA  | 58.0           | 1                               | 64.40                            | 71.20  | 1              | 93.6                             | 4.28              |
| SMAJ60A     | SMAJ60CA  | SMAJ60A  | SMAJ60CA  | 60.0           | 1                               | 66.70                            | 73.70  | 1              | 96.8                             | 4.14              |
| SMAJ64A     | SMAJ64CA  | SMAJ64A  | SMAJ64CA  | 64.0           | 1                               | 71.10                            | 78.60  | 1              | 103.0                            | 3.89              |
| SMAJ70A     | SMAJ70CA  | SMAJ70A  | SMAJ70CA  | 70.0           | 1                               | 77.80                            | 86.00  | 1              | 113.0                            | 3.54              |
| SMAJ75A     | SMAJ75CA  | SMAJ75A  | SMAJ75CA  | 75.0           | 1                               | 83.30                            | 92.10  | 1              | 121.0                            | 3.31              |
| SMAJ78A     | SMAJ78CA  | SMAJ78A  | SMAJ78CA  | 78.0           | 1                               | 86.70                            | 95.80  | 1              | 126.0                            | 3.18              |
| SMAJ85A     | SMAJ85CA  | SMAJ85A  | SMAJ85CA  | 85.0           | 1                               | 94.40                            | 104.0  | 1              | 137.0                            | 2.92              |

**Electrical Characteristics (T=25°C)**

| Part Number |           | Marking  |           | V <sub>R</sub> | I <sub>R</sub> @ V <sub>R</sub> | V <sub>BR</sub> @ I <sub>T</sub> |        | I <sub>T</sub> | V <sub>C</sub> @ I <sub>PP</sub> | I <sub>PP</sub> <sup>①</sup> |
|-------------|-----------|----------|-----------|----------------|---------------------------------|----------------------------------|--------|----------------|----------------------------------|------------------------------|
| Uni- Polar  | Bi- Polar | Uni      | Bi        | V              | μA                              | min(V)                           | max(V) | mA             | max(V)                           | A                            |
| SMAJ90A     | SMAJ90CA  | SMAJ90A  | SMAJ90CA  | 90.0           | 1                               | 100.0                            | 111.0  | 1              | 146.0                            | 2.74                         |
| SMAJ100A    | SMAJ100CA | SMAJ100A | SMAJ100CA | 100.0          | 1                               | 111.0                            | 123.0  | 1              | 162.0                            | 2.47                         |
| SMAJ110A    | SMAJ110CA | SMAJ110A | SMAJ110CA | 110.0          | 1                               | 122.0                            | 135.0  | 1              | 177.0                            | 2.26                         |
| SMAJ120A    | SMAJ120CA | SMAJ120A | SMAJ120CA | 120.0          | 1                               | 133.0                            | 147.0  | 1              | 193.0                            | 2.08                         |
| SMAJ130A    | SMAJ130CA | SMAJ130A | SMAJ130CA | 130.0          | 1                               | 144.0                            | 159.0  | 1              | 209.0                            | 1.92                         |
| SMAJ150A    | SMAJ150CA | SMAJ150A | SMAJ150CA | 150.0          | 1                               | 167.0                            | 185.0  | 1              | 243.0                            | 1.65                         |
| SMAJ160A    | SMAJ160CA | SMAJ160A | SMAJ160CA | 160.0          | 1                               | 178.0                            | 197.0  | 1              | 259.0                            | 1.55                         |
| SMAJ170A    | SMAJ170CA | SMAJ170A | SMAJ170CA | 170.0          | 1                               | 189.0                            | 209.0  | 1              | 275.0                            | 1.46                         |
| SMAJ180A    | SMAJ180CA | SMAJ180A | SMAJ180CA | 180.0          | 1                               | 201.0                            | 222.0  | 1              | 292.0                            | 1.37                         |
| SMAJ190A    | SMAJ190CA | SMAJ190A | SMAJ190CA | 190.0          | 1                               | 209.0                            | 233.0  | 1              | 308.0                            | 1.30                         |
| SMAJ200A    | SMAJ200CA | SMAJ200A | SMAJ200CA | 200.0          | 1                               | 224.0                            | 247.0  | 1              | 324.0                            | 1.24                         |
| SMAJ210A    | SMAJ210CA | SMAJ210A | SMAJ210CA | 210.0          | 1                               | 237.0                            | 263.0  | 1              | 340.0                            | 1.18                         |
| SMAJ220A    | SMAJ220CA | SMAJ220A | SMAJ220CA | 220.0          | 1                               | 246.0                            | 272.0  | 1              | 356.0                            | 1.13                         |
| SMAJ250A    | SMAJ250CA | SMAJ250A | SMAJ250CA | 250.0          | 1                               | 279.0                            | 309.0  | 1              | 405.0                            | 0.99                         |
| SMAJ300A    | SMAJ300CA | SMAJ300A | SMAJ300CA | 300.0          | 1                               | 335.0                            | 371.0  | 1              | 486.0                            | 0.83                         |
| SMAJ350A    | SMAJ350CA | SMAJ350A | SMAJ350CA | 350.0          | 1                               | 391.0                            | 432.0  | 1              | 567.0                            | 0.71                         |
| SMAJ400A    | SMAJ400CA | SMAJ400A | SMAJ400CA | 400.0          | 1                               | 447.0                            | 494.0  | 1              | 648.0                            | 0.62                         |
| SMAJ440A    | SMAJ440CA | SMAJ440A | SMAJ440CA | 440.0          | 1                               | 492.0                            | 543.0  | 1              | 713.0                            | 0.57                         |
| SMAJ550A    | SMAJ550CA | SMAJ550A | SMAJ550CA | 550.0          | 1                               | 614.7                            | 679.4  | 1              | 972.0                            | 0.42                         |

**Notes:**

① Surge waveform: 10/1000μs

 V<sub>R</sub> : Stand-off Voltage -- Maximum voltage that can be applied

 V<sub>BR</sub>: Breakdown Voltage

 V<sub>C</sub>: Clamping Voltage -- Peak voltage measured across the suppressor at a specified I<sub>pp</sub>

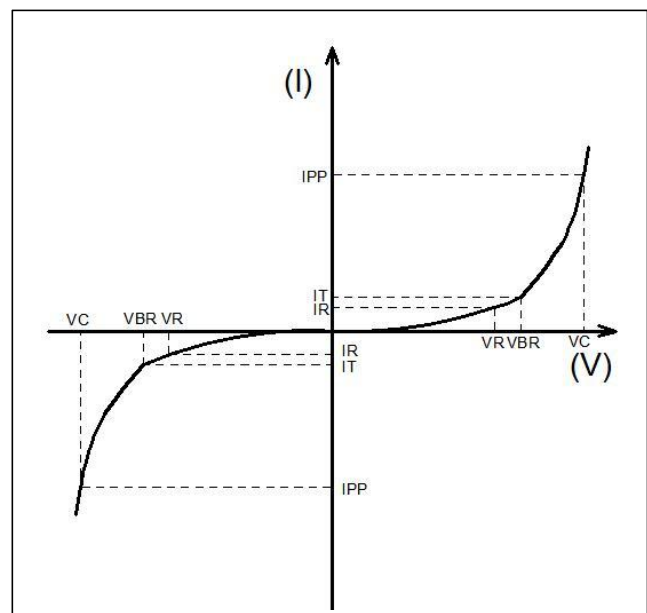
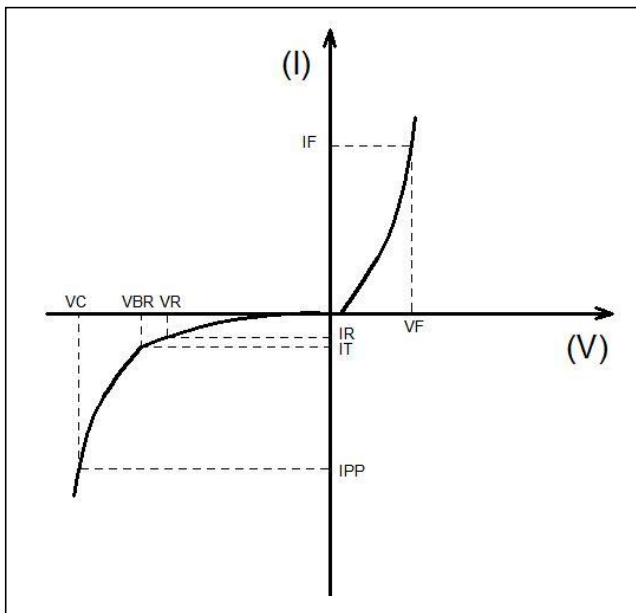
 I<sub>R</sub>: Reverse Leakage Current

**Absolute Maximum Ratings(T=25°C, RH=45%-75%, unless otherwise noted)**

| Parameter  | Symbol             | Value       | Unit |
|--|--------------------|-------------|------|
| Peak pulse power dissipation on 10/ 1000µs waveform    | P <sub>PP</sub>    | 400         | W    |
| Steady state power dissipation at T <sub>L</sub> =75°C | P <sub>M(AV)</sub> | 1.0         | W    |
| Operating junction temperature range                   | T <sub>j</sub>     | -55 to +125 | °C   |
| Storage temperature range                              | T <sub>stg</sub>   | -55 to +150 | °C   |

**Ratings And V-I Characteristics Curves (T=25°C, unless otherwise noted)**

FIG1: V-I cure characteristics



| Symbol | Parameter                          |
|--------|------------------------------------|
| IF     | Mean Forward Current               |
| VF     | Maximum Forward Voltage @ IF       |
| VR     | Peak Reverse Working Voltage       |
| IR     | Reverse Leakage Current @ VR       |
| VBR    | Breakdown Voltage @ IT             |
| IT     | Test Current                       |
| IPP    | Maximum Reverse Peak Pulse Current |
| VC     | Clamping Voltage @ IPP             |

Typical Characteristics

FIG2: Pulse Derating Curve

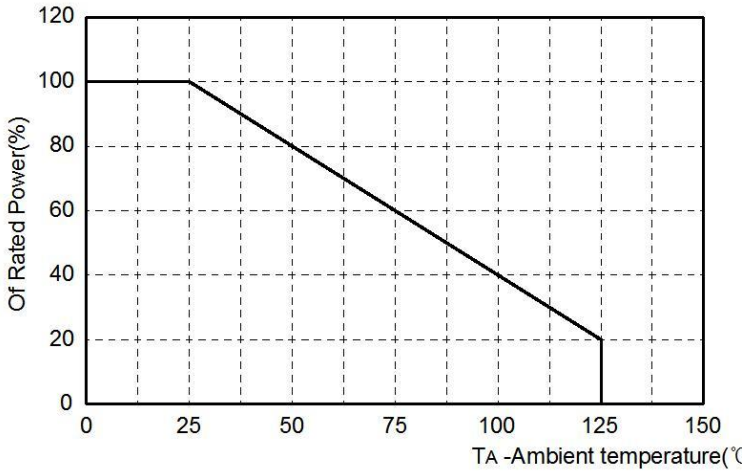


FIG3: Pulse Waveform

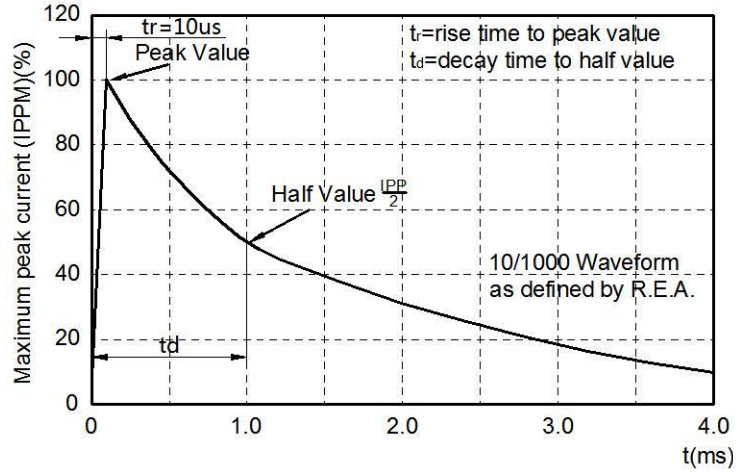


FIG4: Peak Pulse Power Rating Curve

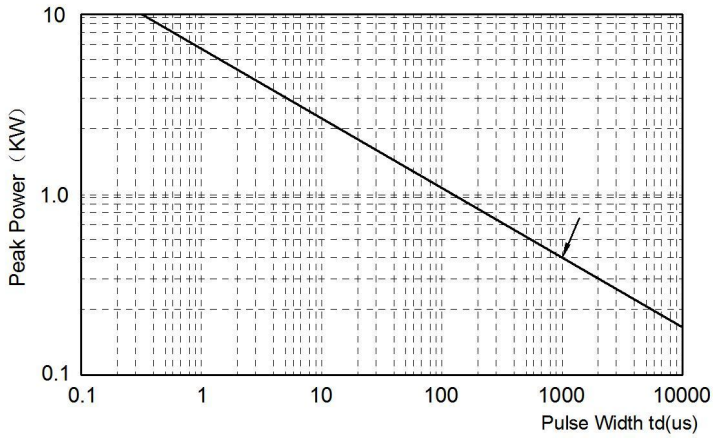
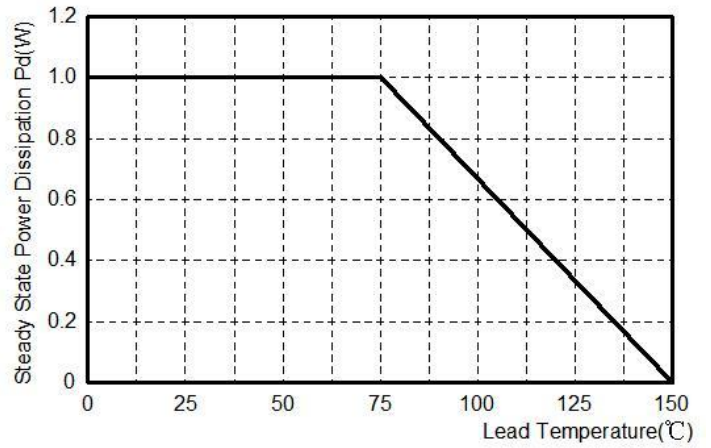
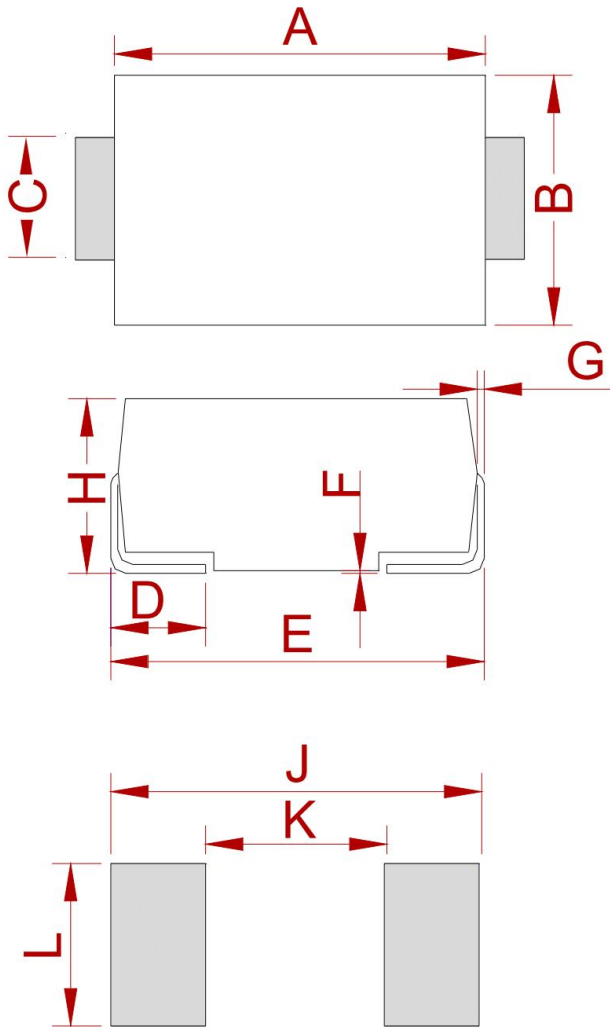


FIG5: Steady State Power Dissipation



**PACKAGE MECHANICAL DATA**



| Ref. | Dimensions  |       |        |       |
|------|-------------|-------|--------|-------|
|      | Millimeters |       | Inches |       |
|      | Min.        | Max.  | Min.   | Max.  |
| A    | 4.25        | 4.65  | 0.167  | 0.183 |
| B    | 2.50        | 2.90  | 0.098  | 0.114 |
| C    | 1.35        | 1.65  | 0.053  | 0.065 |
| D    | 0.76        | 1.52  | 0.030  | 0.060 |
| E    | 4.93        | 5.28  | 0.194  | 0.208 |
| F    | 0.051       | 0.203 | 0.002  | 0.008 |
| G    | 0.15        | 0.31  | 0.006  | 0.012 |
| H    | 1.98        | 2.41  | 0.078  | 0.095 |
| J    | 6.50        |       | 0.256  |       |
| K    |             | 2.30  |        | 0.090 |
| L    | 1.70        |       | 0.067  |       |

**REEL SPECIFICATION**

| P/N          | PKG | QTY  |
|--------------|-----|------|
| SMAJXXXA(CA) | SMA | 2000 |

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